

GLOSSARY

MSD Project Hazard Guide

Activity Hazard Document (AHD): An AHD is a written documentation of significant project hazards and a description of the controls necessary to perform the work safely. AHDs are initiated by the PI, developed jointly with EH&S, and approved by the Division and EH&S. See PUB-3000, Chapter 6.

Biohazard: Biohazardous material is defined as a material of biological origin capable of causing disease or infection in healthy humans. This potentially includes all agents classified by The Center for Disease Control or National Institute of Health, bloodborne pathogens, recombinant DNA, human tissue cultures, and cell cultures. See PUB-3000, Chapter 4. There are four biohazard levels:

- Level 1: well characterized agents of minimal potential hazard to laboratory personnel and the environment (e.g., pseudomonas or actinomycetes).
- Level 2: agents of moderate potential hazard to personnel and the environment (e.g., vaccinia or hepatitis).
- Level 3: indigenous or exotic agents which may cause serious or potential lethal disease as a result of exposure by inhalation (e.g., hanta or yellow fever).
- Level 4: dangerous and exotic agents which pose a high individual risk of aerosol-transmitted laboratory infections and life threatening disease (e.g., ebola or marburg).

Chemical Hygiene and Safety Plan (CHSP): Berkeley Lab, Pub 5341. Available on the web at http://www.lbl.gov/ehs/chsp/html/chsp_site_map.htm.

Confined or Oxygen Deficient Space: A confined space is an enclosed area in which personnel entry and exit are possible but physically restricted, and a hazardous atmosphere or physical hazards may be present. Hazardous atmospheres may include oxygen deficiency (i.e., less than 19.5% oxygen) or airborne contaminants. Identified confined spaces are designated by exterior signs and their entry is controlled by procedure or permit via the Confined Space Program. Confined Spaces may include for example tanks, chambers, trenches, or manholes. Even spaces without restricted access may have potential for oxygen deficiency or life-threatening air contaminants, although these spaces are not common. These conditions do not normally occur unless there are very large volumes of gases and/or enclosed spaces with limited ventilation. An example would be a large quantity of liquid nitrogen that could leak into a cave.

Flammable Gas: Flammable gas is a gas that can be ignited in air. The concentration of the gas must be greater than or equal to the gas's lower explosive limit. Examples include hydrogen ($\geq 4\%$) and methane ($\geq 5\%$). Flammable gases can be identified by MSDS or flammable designation stickers on the cylinder.

Health Hazard Gas: Health hazard gases include gases that may cause significant acute or chronic toxic health effects in people at lower concentrations. These gases can, for example, poison someone and /or cause corrosion, irritation, and disease in human tissue. National Fire Protection Association (NFPA) health hazard classifications that are found on many MSDSs are used to define many gases that are included. See Pub3000 (Chapter 13, Section 13.7.2 and Appendix B) for additional information and a list of gases. Example NFPA health classifications include: fluorine (Class 4) and ammonia gas (Class 3).

Laser: Laser classifications are used to designate hazard levels as described in Pub3000 (Chapter 16, Section 16.3). Class 3b and 4 lasers present the greatest hazard.

National Fire Protection Association (NFPA)

Noise: Exposures to noise in excess of 85 dBA (decibels) of continuous exposure over eight hours. A power lawnmower, for example, produces noise in the approximate range of 80 to 95 dBA.

Pressure system: Pressure systems are either Low Hazard or High Hazard (Pub 3000 Chapter 7, Sections 7.5.1 & 7.6).

Low Pressure Gas Systems are pressure systems operating below 1 MPa gauge (150 psig) and consisting only of regulator, tubing, gauges, valves and fittings. They do not require special authorization documentation. Low pressure systems include:

- Air and inert gas systems to 1 MPa gauge (150 psig) and inert liquid systems to 10 MPa gauge (1,500 psig), with a total stored energy of not more than 100 kJ (75,000 ft-lb).
- Utility systems to 2 MPa gauge (300 psig), including water, compressed gas, natural gas, butane, propane, and steam systems in compliance with Facilities Department standards. These systems are inspected and maintained by the Facilities Department.
- Compressed gas cylinder manifolds assembled by the Facilities Department Regulator Shop.
- Unmodified, commercially-manufactured, hydraulic systems to 35 MPa gauge (5,000 psig) such as hydraulic presses, machine tools, and motorized vehicles, provided routine inspection and maintenance are done.
- Department of Transportation (DOT) shipping containers supplied by regular commercial suppliers.
- Air pressure tanks, boilers and certain other vessels inspected periodically in accordance with the Unfired Pressure Vessel Safety Orders or the Boiler and Fired Pressure Vessel Safety Orders of the State of California.

High Hazard Pressure Systems are pressure systems that do not fall into the low hazard category and require Safety Notes and/or AHDs. Specifically, high hazard pressure systems include:

- All pressure vessel systems that contain oxygen or irritant, toxic, infectious, flammable, and/or radioactive materials at any pressure.
- All pressurized equipment (including ASME-coded vessels that have been structurally modified) that operates at gas pressures over 1 MPa gauge (150 psig) or at liquid pressures over 10 MPa gauge (1,500 psig), or that contains over 100 kJ (75,000 ft-lb) of stored energy.

Pyrophoric Gas: Pyrophoric gases may spontaneously ignite in air at or below 54C (130F). Specific gases may not ignite in all circumstances or may explosively decompose. Examples include silane and phosphine. See the Chemical Hygiene and Safety Plan, Sec. D-3 (Highly Toxic and/or Pyrophoric Gases).

Safety Note: A *Safety Note* documents a system's engineering design and defines its operating parameters, as well as pressure test procedures, to assure the safety of the system. For commercial systems, the vendor's documentation may be substituted for a Safety Note. Safety Notes, or the equivalent vendor's documentation, must be approved by the Engineering Division Director or his or her designated Pressure Engineer. A template Safety Note is provided in Pub 3000, Chapter 7, Appendix C.

Radiological Work Authorization (RWA): An RWA is an authorization for the use of radioactive materials in projects. The document identifies precautions, limits of use, and requirements. RWAs are requested by the PI and issued by the Radiation Protection Group. See Pub 3000, Chapter 21, Sec 21.4 for more information.

Sealed Source Authorization (SSA): An SSA is an authorization for the use of radioactive Sealed Sources. The document identifies precautions, limits of use, and requirements. SSAs are requested by the PI and issued by the Radiation Protection Group. See Pub 3000, Chapter 21, Sec 21.10.12 for more information.

Uniquely Unstable, Reactive, or Toxic Chemicals: Many chemicals have properties of instability, reactivity, or toxicity, but the hazard associated with some chemicals or chemical uses is much more significant and/or unique. The risk, controls, and level of authorization need to store or use these chemicals should be determined with supervisor and EH&S consultation. Authorizations might range from agreement on required controls to establishment of an AHD.

Unstable or reactive chemicals may vigorously polymerize, decompose, combine, or become self-reactive under conditions of shock, pressure, or temperature when in storage or use. Examples of chemicals that may be unstable or reactive are listed below. Additional information is contained in the Chemical Hygiene and Safety Plan (CHSP), Section D-3 and G-6.

- Water Reactive: sodium, lithium, potassium, phosphorous (white)

- Pyrophorics: many organometalics, triethylaluminum, titanium chloride
- Peroxide Formers: ethyl ether, isopropyl ether, other alkyl ethers, tetrahydrofuran, sodium amide, potassium metal, divinylacetylene, 1, 1- dichloroethylene
- Perchlorates: perchloric acid
- Explosive: lead azide, picric acid, hydrazine

Uniquely toxic chemical uses might include use of carcinogens, reproductive toxins, or acutely toxic materials where human exposure is possible. Additional information is contained in the CHSP Sections D and G:

- Carcinogens: CHSP Section G-2 and Appendices 9, 10, and 11 (e.g. benzene, acrylamide, cadmium)
- Reproductive Toxins: CHSP Section G-3 and Appendix 13 (e.g. benzene, ethylene dibromide)
- Acutely Toxic Substances: CHSP Section G-1 (e.g. arsenic)